The Flood-Prone Watershed

The Susquehanna basin is one of the nation's most flood-prone areas. Additionally, the main stem Susquehanna River is more prone to ice jams and subsequent flooding than any other river east of the Rocky Mountains.

The basin's topography, geology and nearly 30,000 miles of streams are some of the contributing factors. The following are two distinct ways that the basin's topography and geology can cause flooding.

The first situation occurs when a section of river is very wide, but then is suddenly squeezed into a steep, narrow gorge. During heavy rainfall events or when the winter ice begins to break up, the increased flow of water or ice backs up in the narrow gorge, causing the river to overflow its banks. Also, when the ice jam breaks, a sudden surge of water can cause downstream flooding.

The second situation occurs when a river flows through an area with very little slope and shallow banks. In this topography, which is fairly common in the basin, the river levels out and flows slowly. During heavy rainfall events, the river quickly swells and overflows its banks. When winter ice breaks up, the slow-moving flow causes the ice to jam easily, creating obstacles and backing up the water.

Williamsport, Pa.

Susquehanna Basin Flood Stages

When flooding begins...

NEW YORK

(Partial List)

Canisteo River
West Cameron 18 ft.
Addison 17 ft.

Chemung River
Corning 29 ft.
Elmira 12 ft.
Chemung 16 ft.

Chenango River
Sherburne 8 ft.
Greene 13 ft.
Chenango Forks 10 ft.

Cohocton River
Campbell 8 ft.

Ostelic River
Cincinnatus 9 ft.

Susquehanna River
Unadilla 11 ft.
Bainbridge 13 ft.
Conklin 11 ft.
Binghamton 14 ft.
Vestal 18 ft.

Tioga River
Lindley 17 ft.
Erwins 18 ft.

Tioughnioga River
Cortland 8 ft.
Lisle 9 ft.

Unadilla River
Rockdale 11 ft.

PENNSYLVANIA

(Partial List)

Bald Eagle Creek
Beech Creek Station 11 ft.

Conestoga River
Lancaster 11 ft.

Conodoguinet Creek
Hogestown 8 ft.

Juniata River
Huntingdon 12 ft.
Lewistown 23 ft.
Newport 22 ft.

Lackawanna River
Old Forge 11 ft.

Loyalsock Creek
Loyalsockville 12 ft.

Penns Creek
Penns Creek 8 ft.

Pine Creek
Cedar Run 12 ft.

Susquehanna River
Towanda 16 ft.
Meshoppen 27 ft.
Wilkes-Barre 22 ft.
Bloomsburg 19 ft.
Danville 20 ft.
Sunbury 24 ft.
Harrisburg 17 ft.
Marietta 49 ft.

Swatara Creek
Harper Tavern 9 ft.
Hershey 7 ft.

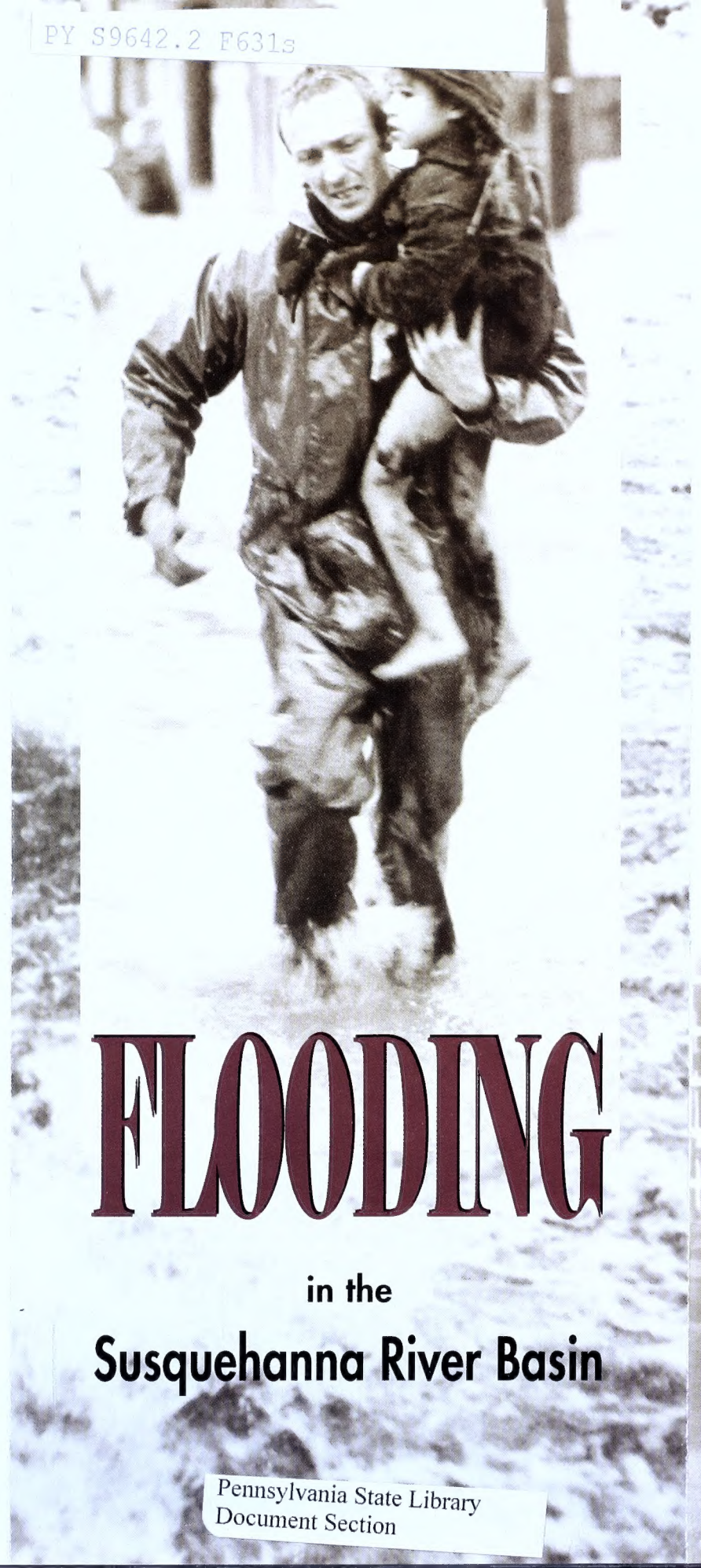
W. Branch Susquehanna
Lock Haven 21 ft.
Jersey Shore 26 ft.
Williamsport 19 ft.
West Milton 19 ft.
Lewisburg 18 ft.

Yellow Breeches Creek
Camp Hill 7 ft.

Official National Weather Service Flood Stages in 2002

Cover photo from the collection of the Historical Society of Dauphin County – John Harris/Simon Cameron Mansion, Harrisburg, Pa.

PY S9642.2 F631s



FLOODING

in the Susquehanna River Basin

Pennsylvania State Library
Document Section

Large-Scale & Flash Floods

The people of the Susquehanna River Basin have long experienced large-scale floods of devastating proportions. Native Americans first told of serious floods occurring about every 14 years along the Susquehanna River. Since the early 1800s, the main stem Susquehanna River has flooded on average once every 20 years.

The Susquehanna basin also is vulnerable to frequent, localized flash floods every year. These flash floods, usually affecting smaller tributaries, can occur with little advance warning.

Large-scale and localized flash floods both cause significant property damages and often result in the loss of lives. In June 1972, Hurricane Agnes caused the worst recorded flood in the Susquehanna basin – 67 people were killed throughout the basin and damages were estimated at $3.2 billion.

At the time, the Agnes flood was the nation's most destructive and costly natural disaster.

Other years when large-scale, devastating floods occurred in the basin include 1865, 1936, 1955, 1975, and 1996.

Flood Loss Reduction

Of the 1,400 communities in the Susquehanna basin, about 1,160 have residents located in flood-prone areas. Roughly 30 percent of the basin's population lives along major rivers.

While no one can prevent floods, the resulting damages can be reduced through: (1) proper planning to avoid building in flood-prone areas; and (2) flood management and protection.

Due to the diverse conditions and flood-prone nature of the Susquehanna basin, flood management programs work best when structural and nonstructural measures are combined.

Structural Flood Control

This floodwall along the Susquehanna in Sunbury, Pa., held back the river's raging floodwaters during Hurricane Agnes.

Structural flood control devices include:

- dams and reservoirs
- floodwalls and levees
- channel excavation and modification

Flood control dams and reservoirs store significant amounts of floodwater to reduce or prevent downstream flooding. Floodwalls and levees prevent floodwaters from inundating designated areas. These structural devices substantially reduce the basin's average annual flood damages.

Nonstructural Programs

Nonstructural flood protection programs include:

- flood forecast and warning systems
- flood insurance
- relocation
- flood education and training
- floodproofing
- flood plain management

Nonstructural flood measures can be extremely cost-effective. Among the most cost-effective is the Susquehanna Flood Forecast and Warning System. The flood damages the system prevents annually have averaged 12.5 times the cost of operating it. As shown below, radar and a network of rain and stream gages provide the data that are used to forecast river levels and issue more accurate early flood warnings. Early warnings give people and businesses time to secure their property and get themselves out of harm's way.

SRBC's Flood Management and Protection Program

The Susquehanna River Basin Commission (SRBC) has been involved in flood management and protection since the early 1970s. The agency provides a wide range of services, including:

Flood forecast and warning system

Since the mid-1980s, SRBC has coordinated the inter-agency committee that maintains and updates the basin's flood forecast and warning system.

The committee members are: SRBC; National Weather Service; U.S. Geological Survey; U.S. Army Corps of Engineers; N.Y. State Dept. of Environmental Conservation; N.Y. State Emergency Management Office; Pa. Dept. of Environmental Protection; Pa. Emergency Management Agency; Pa. Dept. of Community and Economic Development; Maryland Emergency Management Office; and Maryland Department of the Environment.

SRBC also helps communities establish local self-help flood warning programs.

Flood plain management

SRBC helps identify floodways and flood-prone areas and advises industry and municipal officials on techniques for floodproofing structures to reduce flood damages. SRBC also has completed 245 flood insurance studies and has prepared over 50 flood plain assessment reports – covering all high-population and high-damage areas in the basin.

Flood stage forecast mapping

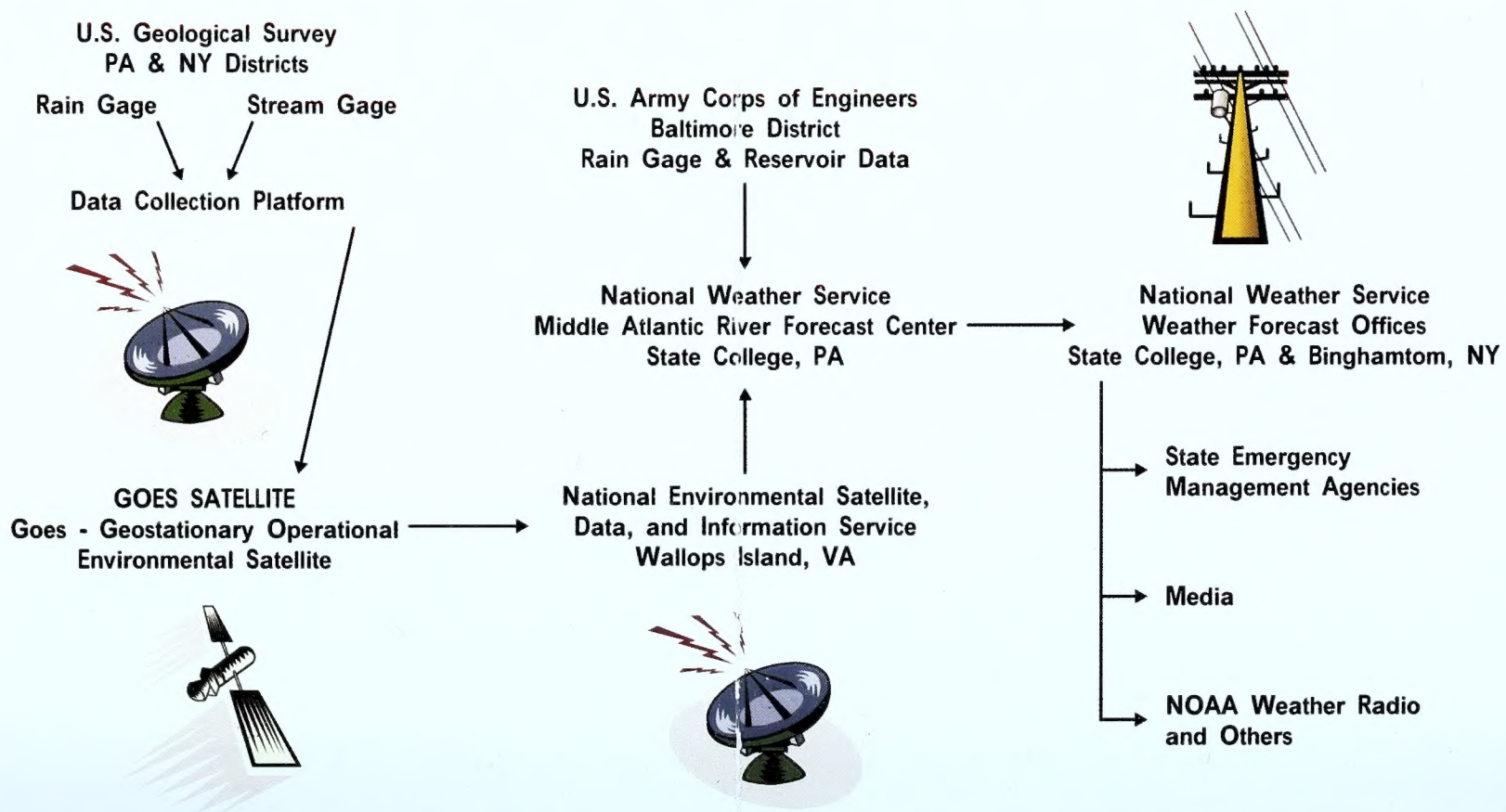
SRBC produces community flood stage forecast maps that detail flood plain areas and give flood profiles to show the areas that will be inundated as flood waters reach designated flood stages. Contact SRBC for a list of, or to order, community maps.

Flood education and training

SRBC produces educational brochures and other publications on flooding and flood management. SRBC staff are available for speaking engagements and also offer training to:

- emergency management and locally-elected officials on how to use their community flood stage maps
- local officials on how to interpret flood insurance information and stream hydraulics
- current and future drivers on the dangers of crossing flooded roadways

Susquehanna River Basin Flood Forecast and Warning System Overview



The Susquehanna River Basin Commission is the governing agency established in January 1971 under a 100-year compact signed by the federal government and the states of New York, Pennsylvania, and Maryland to protect and wisely manage the water resources of the Susquehanna River Basin. The Susquehanna River starts in Cooperstown, N.Y., and flows 444 miles to Havre de Grace, Md., where the river flows into the Chesapeake Bay.

Susquehanna River Basin Commission
1721 North Front Street, Harrisburg, PA 17102-2391
Phone: (717) 238-0423 • Fax: (717) 238-2436
Web site: www.srbc.net • E-mail: srbc@srbc.net

This brochure was funded by a grant from the Chesapeake Bay Commission.

Reprints funded through the Susquehanna River Basin Flood Forecast & Warning Initiative.

Printed on Recycled Paper